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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/054,938	01/25/2002	Hiroshi Kanazawa	218844US2SRD	6948

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EXAMINER

EDOUARD, PATRICK NESTOR

ART UNIT	PAPER NUMBER
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2626

DATE MAILED: 05/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/054,938	KANAZAWA ET AL.	
	Examiner	Art Unit	
	Patrick N. Edouard	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02/21/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to communication filed 02/21/2006 . Claims 1-14 are pending.

Response to Arguments

2. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 and 8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The limitation "the subtraction spectrum being partially substituted by a specific value with respect to a portion having a value smaller than the specific value" is not described in the specification so to enable one of ordinary skill in the art as to how or use it. In fact, this limitation seems to be related to what is described on pages 12, line 11 to page 13, line 5 of the specification. The examiner will interpret this limitation to

mean that the subtraction spectrum will be substituted by changing the value of the subtraction coefficient to a smaller value.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1-4 and 8-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (USPN 6,044,341) and in view of Arslan et al. (5,706,395).

Regarding claims 1 and 8, Takahashi discloses a method and apparatus of suppressing noise components contained in an input speech signal, comprising:

- obtaining an input spectrum by executing frequency (spectrum) analysis of the input speech signal by a specific (predetermined) frame length (col. 7, lines 38-50);
- obtaining an estimated noise spectrum by estimating a spectrum of the noise components (col. 7, lines 51-55);
- multiplying (product) the estimated noise spectrum by a specific spectral subtraction coefficient determined by the spectral slope (The reference implicitly teaches use of the slope in determining the value of the spectral subtraction coefficient. For based on the number of frequency components whose amplitudes are negative, the subtraction coefficient-setting unit

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subtracts a nominal value from the coefficient (SC). The process is iterated until the number of frequency components whose amplitudes are negative is less than a predetermined number. Since the number of negative amplitudes inherently is a function of noise spectral slope, it determines the value of the subtraction coefficient) and obtaining a subtraction spectrum by subtracting the estimated noise spectrum multiplied with the spectral subtraction (predetermined) coefficient from the input spectrum (Fig. 9, steps 29-32; col. 11, lines 33-57);

- obtaining a speech spectrum by clipping (half wave rectification) the subtraction spectrum, the subtraction spectrum being partially substituted by a specific value with respect to a portion having a value smaller than the specific value (Examiner interprets the limitation of clipping as a process for avoiding the speech spectrum from assuming a negative value)(col. 11, lines 44-62, the subtraction coefficient setting unit 43 subtracts 0.5 from the subtraction coefficient sc and the equation $E(n) = S(n) - sc \cdot N(n)$ (3) will be substituted by equation $E(n) = S(n) - (0.5 - sc) \cdot N(n)$).

Takahashi fails to disclose of correcting the speech spectrum by smoothing in at least one of frequency and time domain. However, Arslan et al. disclose a method of correcting the speech spectrum by smoothing in at least one of frequency and time domain (Fig. 3; col. 8, lines 14-16). Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to

supplement Takahashi's method for suppressing noise with Arslan et al.'s method of smoothing to reduce noise fluctuations in the speech signal, as taught by Arslan et al. (col. 8, lines 25-26).

Regarding claim 2 and 4, Takahashi fails to disclose of smoothing the speech spectrum using neighboring speech spectrum elements and convoluting the speech spectrum using a specific function in at least one of the frequency and time domains. However, Arslan et al. disclose a method of smoothing the speech spectrum using neighboring speech spectrum (frequencies) elements and convoluting the speech spectrum using a specific function ($W(\omega)$) in at least one of the frequency and time domain (The function of $Y(\omega)$ implies that the method of smoothing is occurring in the frequency domain, col. 8, lines 13-20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to supplement Takahashi's method for suppressing noise with Arslan et al.'s method of smoothing to reduce noise fluctuations in the speech signal, as taught by Arslan et al. (col. 8, lines 25-26).

Regarding claim 3, Takahashi fails to disclose of substituting speech spectrum elements with a max value of the neighboring speech spectrum elements. However, Arslan et al. disclose a method wherein correcting (smoothing) the spectrum includes substituting the speech spectrum elements by a maximum value of the neighboring (adjacent) speech spectrum elements (frequencies) (See col. 8, lines 35-50 wherein the transfer function disclosed in line 45 illustrates a maximum value substitution) (col. 8, lines 35-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to integrate Takahashi's method for smoothing during noise suppression with Arslan et al.'s substitution of a maximum value of the neighboring speech elements to reduce the variance of spectral estimation for noisy frames, as taught by Arslan et al. (col. 8, lines 26-27).

Regarding claim 9, claim 9 recites the same or similar limitation as claim 2 above, and so is rejected for the same reasons.

Regarding claim 10, claim 10 recites the same or similar limitation as claim 3 above, and so is rejected for the same reasons.

Regarding claim 11, claim 11 recites the same or similar limitation as claim 4 above, and so is rejected for the same reasons.

6. **Claims 5-7 and 12-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi (USPN 6,044,341) and in view of Arslan et al. (5,706,395) and further in view of Chandran et al (6,523,003)

Regarding claim 5 and 12, Takahashi discloses a method and apparatus of suppressing noise components contained in an input speech signal comprising:

- obtaining indirectly a spectral slope of the estimated noise spectrum (The reference does not explicitly disclose of obtaining the spectral slope however,

the slope is a determining factor in the estimation of the noise spectrum, Fig. 5, step S9; Col. 8, lines 55-60).

The remainder of claim 5 recites the same or similar limitation as claim 1 above, and so is rejected for the same reasons.

It is noted that the combination of Takahashi with Arslan teaches the claimed invention but does not explicitly teach "calculating a spectral ration between a low-frequency range and a high frequency to obtain a spectral slope, and calculating a spectral subtraction coefficient using the spectral ratio. However, this feature is well known in the art as evidenced by Chandran et al who teach on page 18, lines 36-65, the calculation of the ratio of the total noise power in the lower half of the signal to the total noise power in the upper half. Therefore, one having ordinary skill in the art at the time the invention was would have found it obvious to incorporate into the combination of Takahashi with Arslan the calculation as taught by Chandran because it would preserve the natural spectral shape of the speech signal.

Regarding claim 6, Takahashi indirectly discloses a method of suppressing noise components contained in an input speech signal, comprising:

- a smaller spectral subtraction coefficient being set with an increasing spectral slope (A flattened noise spectrum increases the number of negative values than does a noise spectrum with a smaller r). Takahashi teaches that the subtraction coefficient is decreased if the number of negative amplitude components is larger than a predetermined threshold number. Therefore, a

noise spectrum with a large number of negative amplitude components has an increasing spectral slope (r). See col. 11, lines 44-57).

Regarding claim 7, claim 7 recites the same or similar limitation as claim 2 above, and so is rejected for the same reasons

Regarding claim 13, claim 13 recites the same or similar limitation as claim 6 above, and so is rejected for the same reasons.

Regarding claim 14, claim 14 recites the same or similar limitation as claim 2 above, and so is rejected for the same reasons.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick N. Edouard whose telephone number is 7033086725. The examiner can normally be reached on M-TH 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on 571 272 7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PNE


Primary Examiner